

CLAIMS

1. A switching power supply comprising:  
at least one switching section which  
repeats ON/OFF operation to convert an input  
voltage to an AC voltage;

a transformer having a primary winding,  
to which the AC voltage obtained by the  
conversion performed by said switching section is  
applied, and a secondary winding;

a synchronous rectifier section for  
rectifying a voltage induced in the secondary  
winding of said transformer by switching  
operation;

a smoothing section for smoothing the  
voltage rectified by said synchronous rectifier  
section to form an output voltage;

a PWM control circuit which forms a PWM  
signal for controlling said output voltage to  
determine an ON/OFF ratio of said switching  
section; and

a drive transformer which stores energy  
necessary for the switching operation of said  
synchronous rectifier section to ON/OFF-drive  
said synchronous rectifier section according to  
said PWM signal.

2. A switching power supply comprising:  
at least one switching section which  
repeats ON/OFF operation to convert an input  
voltage to an AC voltage;

a transformer having a primary winding,  
to which the AC voltage obtained by the  
conversion performed by said switching section is  
applied, and a secondary winding;

a synchronous rectifier section for  
rectifying the voltage induced in the secondary  
winding of said transformer by switching  
operation;

a smoothing section for smoothing the  
voltage rectified by said synchronous rectifier  
section to form an output voltage;

a PWM control circuit which forms a PWM  
signal for controlling said output voltage to  
determine an ON/OFF ratio of said switching  
section;

an auxiliary power supply for use in  
driving said synchronous rectifier section;

a first drive switch and a second drive  
switch which are connected in series to form a  
first series circuit, said first series circuit  
being connected to an output of said auxiliary

power supply;

a drive transformer which has a primary winding and a secondary winding, stores energy for driving said synchronous rectifier section, and is connected so that a drive current of said synchronous rectifier section flows through said secondary winding;

a first capacitor which is connected in series with the primary winding of said drive transformer so that a second series circuit is formed, said second series circuit being connected across said second drive switch to eliminate a DC voltage to be applied to said drive transformer; and

a drive control circuit which makes said first drive switch and said second drive switch perform ON/OFF operation alternately in synchronism with said PWM signal and applies a positive/negative voltage by alternation to the primary winding of said drive transformer to store said exciting energy, and ON/OFF-drives said synchronous rectifier section by said exciting energy stored in the period during which said first drive switch and said second drive switch are simultaneously OFF.

3. A switching power supply in accordance with claim 1 having a drive transformer control circuit which sets a desired OFF period according to the PWM signal and repeats ON/OFF operation alternately, wherein said drive transformer control circuit drives the drive transformer via the capacitor.

4. A switching power supply in accordance with claim 1, wherein the synchronous rectifier section is connected via a capacitor to the primary side of the drive transformer, a drive transformer control circuit is connected via a capacitor to the secondary side of said drive transformer, and said drive transformer is driven by the ON/OFF operation of said drive transformer control circuit.

5. A switching power supply in accordance with claim 3, wherein the drive transformer control circuit has two switching devices which repeat ON/OFF operation alternately, sets a desired OFF period according to the PWM signal, and drives the drive transformer via the capacitor.

6. A switching power supply comprising:  
at least two switching sections which  
have minuscule stop periods and repeat ON/OFF  
operation to convert an input voltage to an AC  
voltage;

a transformer which has a primary  
winding, to which the AC voltage obtained by the  
conversion performed by said switching section is  
applied, and a secondary winding, and stores  
exciting energy;

a synchronous rectifier section for  
rectifying a voltage induced in the secondary  
winding of said transformer by switching  
operation;

a smoothing section for smoothing the  
voltage rectified by said synchronous rectifier  
section to form an output voltage;

a PWM control circuit which forms a PWM  
signal for controlling said output voltage to  
determine an ON/OFF ratio of said switching  
section; and

a drive transformer for ON/OFF-driving  
said synchronous rectifier section according to  
said PWM signal or a voltage signal applied to  
said switching section, wherein

the switching operation of said

synchronous rectifier section is performed via the drive transformer by the energy stored in said transformer.

7. A switching power supply in accordance with claim 5, wherein the voltage applied to the switching section is applied to the primary winding of the drive transformer via the capacitor.

8. A switching power supply in accordance with any one of claims 1 to 7, wherein the switching section comprises a bridge-type or push-pull-type converter.

9. A switching power supply in accordance with claim 6 or claim 7, wherein the PWM control circuit exercises control so that the switching section short-circuits the primary winding of the transformer, and sets the period during which energy necessary for the switching operation of the synchronous rectifier section can be retained in said transformer.